Basic Number Facts

Practice

PLATO
EDUCATIONAL SOFTWARE

CONTROL DATA

BASIC NUMBER FACTS: Practice

PLATO®

EDUCATIONAL SOFTWARE

Printed in the United States of America

Adapted From:

SPEEDWAY

A RACE TO IMPROVE YOUR SPEED WITH NUMBER FACTS

by
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While at the University of Illinois

CREDITS

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DISTRIBUTION INFORMATION

For additional information on this and other PLATO Educational Software, please write to:

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PREFACE

BASIC NUMBER FACTS: Practice is a PLATO educational software package. The computer activity is called PLATO Speedway, and the activity is referred to as Speedway or the Speedway activity in this text. It is available for use on APPLE II PLUS®, ATARI 800®, and TEXAS INSTRUMENTS 99/4A® microcomputers.

Speedway is designed to support elementary school math curricula. It provides interactive drill and practice on basic number facts from 0 through 10 using an automobile race track format. The student "wins" a race when less time is taken to answer the problems correctly than was taken in a previous race.

The package contains one or more flexible disks and a support manual. The disk(s) contain the Speedway computer activity and its playing instructions. The manual contains an introduction to Speedway, the lesson flow and teaching strategies, sample worksheets, and suggested supplementary activities.

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TEXAS INSTRUMENTS 99/4A is a trademark of Texas Instruments, Incorporated.

CONTENTS

I. EQUIPMENT CONFIGURATION AND LOADING INSTRUCTIONS

EQUIPMENT CONFIGURATION

In order to run a PLATO computer-based activity, one of the following microcomputer systems is necessary:

1. An APPLE II Plus with the following:
   a. TV or a monitor
   b. 48K memory
   c. Disk drive and controller
   d. DOS 3.3 operating system
2. An ATARI 800 with the following:
   a. TV or a monitor
   b. 48K memory
   c. Disk drive and controller
   d. DOS 2 operating system

3. A TEXAS INSTRUMENTS 99/4A with the following:
   a. TV or a monitor
   b. 32K memory expansion
   c. Disk drive and controller
   d. PLATO Interpreter Cartridge*

LOADING THE MICROCOMPUTER

The Speedway activity is contained on a flexible disk that must be inserted into the disk drive. Figure 1 below shows a disk and a disk drive.

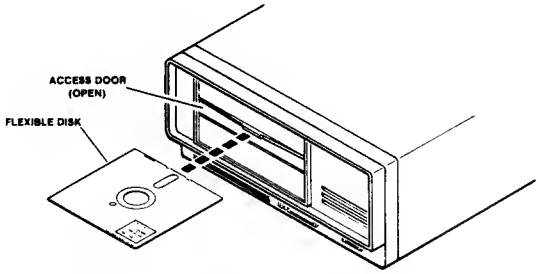

Figure 1. Disk and Disk Drive

To load the Speedway activity into the computer, follow the instructions for your microcomputer.

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*See the distribution information.

APPLE II PLUS

1. Make sure the APPLE II Plus is off.
2. Insert the disk into the disk drive (see figure 1) and close the door of the disk drive.
3. Turn on the APPLE II Plus microcomputer.
4. The title page for Speedway will appear on the screen.

ATARI 800

1. If the BASIC Computing Language (left cartridge) has not been removed, you must remove it.
2. Make sure that both the ATARI 800 computer and the ATARI 810 Disk Drive are turned off.
3. Turn on the ATARI 810 Disk Drive and wait for the busy light to go out.
4. Insert the disk into the disk drive (see figure 1) and close the door of the disk drive.
5. Now, turn on the ATARI 800 computer.
6. The title page for Speedway will appear on the screen.

TEXAS INSTRUMENTS 99/4A

1. Connect the pieces according to the manufacturer's instructions and plug everything into the AC.
2. Turn on the switches in the following order:
   a. Disk drive
   b. Disk controller
   c. RAM expansion
   d. CPU
   e. Monitor or TV
3. Insert the PLATO Interpreter Cartridge into the CPU. The Texas Instruments standard display will appear on the screen.
4. Press any key.
5. Follow the prompts that appear on the screen to insert the disk and start the lesson.
6. The title page for Speedway will appear on the screen.

II. PUBLISHER'S NOTE

Control Data Publishing Company offers the opportunity to supplement core math curricula with math activity packages. Parents and teachers can use these PLATO microcomputer-based support activities to reinforce concepts taught in the classroom.

The following 16 major topics have been identified as representative of most elementary school arithmetic programs.

1. Numeration - Whole Numbers
2. Addition - Whole Numbers
3. Subtraction - Whole Numbers
4. Multiplication - Whole Numbers
5. Division - Whole Numbers
6. Problem Solving
7. Fractions
8. Decimals
9. Ratio
10. Proportion
11. Percent

12. Geometry
13. Measurement
14. Graphs
15. Probability
16. Integers

The **BASIC NUMBER FACTS: Practice** package can be used as a component in most standard arithmetic curricula. It provides practice on the basic mathematical operations of addition, subtraction, multiplication, and division. Control Data Publishing is working toward a comprehensive coverage of topics in elementary mathematics and other subject matter areas.

III. ACTIVITY PACKAGE SUMMARY

Description: **BASIC NUMBER FACTS: Practice** is a PLATO educational software package. It contains the Speedway interactive computer-based activity and a support manual.

Objective: **BASIC NUMBER FACTS: Practice** is designed to improve basic number fact skills stressing speed and accuracy.

Activity: The Speedway activity has an animated automobile race track format designed to motivate students to practice basic number facts from 0 to 10. The student's goal is to "win" races through self-improvement.

Manual: The support manual supplements the computer-based activity with the following material.

Lesson Flow	The lesson flow describes the steps in the Speedway activity. It includes the features and options available, the scoring, and the record-keeping methods.
Strategies	Speedway can be used as a motivational learning aide for large and small groups as well as for individual students. Group practice and competition are optional activities.
Student Materials	The student materials include four sample worksheets and a sample record-keeping sheet. The intended audience for this material is second and third grade level students.

IV. INTRODUCTION TO SPEEDWAY

Speedway is designed to be an educationally sound learning tool that increases basic number fact skills in an environment of fun, excitement, and challenge. Using an animated race track format with two cars, the game leads a student through a series of races.

There are four separate lessons in Speedway. Each lesson allows a maximum of ten races, and each race has ten problems that must be solved. The goal is to improve speed and accuracy with each race. Each time the problems are solved in less time than in a previous race, the student wins the race.

The four lessons or race tracks are identified by the following races:

- SOAPBOX - addition and subtraction
- DRAG RACE - multiplication
- RALLY - division
- NATIONAL - review (includes all four operations)

These races are run individually by each student. The opponent's time is the student's own time in a previous race. Visual feedback is constantly provided

by the computer. It is always positive and helpful. The student is never frustrated by the lack of a solution. The computer scores the student's answers, provides help when it is requested, and praises the student's accomplishments. As the student's skill level increases, the computer increases the level of difficulty.

Each student's individual progress can be integrated into large group activities. An entire class can work together to increase their skills through Race Car Driver Training worksheets and group time charts. Speedway and its related activities are designed to reinforce concepts taught in the classroom.

While much of the material in this text is intended for classroom use, it is also applicable for a student's use at home, alone or under supervision.

PURPOSE

- To improve basic addition, subtraction, multiplication, and division skills
- To increase speed and accuracy with basic number facts
- To teach students to distinguish quickly among operations

CONCEPTS

1. The SOAPBOX covers basic addition and subtraction facts.
2. The DRAG RACE covers basic multiplication facts.
3. The RALLY covers basic division facts.
4. The NATIONAL covers all four operations

V. LESSON FLOW

LESSON

When Speedway begins, a series of choices must be made by the student. These decisions can be individual choices or the teacher may prescribe the activity options. The following choices must be made:

1. Choose one of four races.
2. Choose the level of difficulty (when applicable).
3. Choose the car and name the driver (ten characters maximum).
4. Choose an opponent's car and name the driver (ten characters maximum).

The student next runs a practice race answering ten problems as they appear on the screen. The student's time in the practice race becomes the opponent's time in the first race.

In the first race, the student tries to beat the practice time on ten problems similar to those presented in the practice race. As the student progresses through the problems, the two animated cars move down the track in front of the grandstand and toward the finish line. When the first car crosses the finish line, a figure waves the winner's flag.

After the race, the winner is declared and the times (in seconds) are posted.

Before proceeding to the next race, the computer points out any problems that were missed or took longer than the others to answer. Those problems are repeated in later races.

During the race, help is available. The computer display will explain how to use the help function. If the student is stymied, the help function provides a hint with a pictorial version of the problem. When the student answers a problem correctly, an "OK" appears next to the answer. If the student answers incorrectly, a "NO" appears next to the answer. To change an incorrect answer, the student can either press the entry key to erase the original answer and try again or ask for help. After three tries, the answer is provided. In order to encourage the student to try to answer problems independently, the help function is available only twice in each race.

To continue running successive races, the student selects the opponent's time from three options:

- The student's last time
- The student's best time

- A reasonable time entered by the student. (The lesson program will not accept an unreasonable time.)

After three races, the student also has the option of leaving the track (signing off and ending the activity).

A maximum of ten races can be run in one lesson. As the student's time decreases, the level of difficulty automatically increases.

SCORING AND RECORD-KEEPING

When a student finishes racing, the final statistics for the races will be displayed. First a graph appears showing the times in all races. A star marks the best race(s). Next a graph appears showing the number of problems answered correctly in each race.

Throughout the activity, messages appear to instruct and motivate the student.

In addition, students may wish to keep records of their best races. The sample score sheet in the Student Materials section may be used for a group of students or an entire class.

INTEGRATION

Speedway can be used as part of the math curriculum for any class studying basic number facts. It can be used as a flash-card-type drill or as an incentive for performance.

The sample worksheets and suggested activities provide group exercises relevant to practicing basic number facts. Speedway can be integrated into math class activities or other areas such as art, recreational, and homework activities. If desired, competitive activities are also an option. The suggested activities are discussed in the Teaching Strategies section of this manual, and the sample worksheets are part of the Student Materials section.

VI. TEACHING STRATEGIES

The strategies included in this text are for use in assisting the teacher to integrate Speedway into classroom activities. These strategies may be used to introduce Speedway into a class, to provide drill and practice on basic number facts, and to provide related activities.

These strategies are intended to be samples and suggestions. Expanded activities derived from the imagination of teachers and students are heartily encouraged as a means of stimulating and motivating students in their basic number facts practice.

PREREQUISITES

Speedway can be assigned to individuals or introduced as a group activity.

Students with basic number facts comprehension can answer the problems. They must also be able to follow the instructions provided by the computer, and they must know how to use the computer.

CLASSROOM STRATEGIES

Large Groups

The format and challenge of Speedway can be integrated into classroom activities. Race Car Driver Training worksheets similar to those provided in the Student Materials section can be used as classroom exercises or assigned as homework. Personal and class records can be kept using either a bar graph format or a race car on a track format.

Small Groups

Equal achievers may compete with one another by running alternate races against each other's time.

Individuals

Speedway can be used as a privilege or incentive for students who have successfully completed other assignments. It can be used as a tutor for students with a special need for one-on-one activity. It can be used as a reinforcement activity where all students take turns practicing skills taught in the classroom.

SAMPLE ACTIVITY STRATEGIES

The following sample activities may be used to introduce Speedway to a class. They present the students with a challenging set of exercises and a personal record-keeping activity that should encourage them to practice basic number facts skills. These activities may be used singly or as an integrated series.

Classroom Preparation Math Activity

Purpose:

- To introduce Speedway and to motivate students to practice basic number facts concepts in a homework assignment.

Materials:

- Race Car Driver Training worksheets.

Sample Narrative:

"Boys and girls, you are all going to have a chance to pretend to be race car drivers. We have a new computer math activity called Speedway, and all of you can be race car drivers. You will each get to choose your own car and name the driver. Then, when you play the game, you can watch your car

race against another car. You can drive a sleek race car, or you can fool everyone and win in a funny old jalopy."

"But before the race begins, you must take your Race Car Driver Training. You see, to win the race, you will have to answer ten arithmetic problems on the computer as quickly and as accurately as you can. Don't worry about getting stuck. If you do, the computer will help you. As you get better, you will win more and more races and keep breaking your old records."

"Sounds like fun, right? Now, let's get busy with our Race Car Driver Training. I'm going to pass out a worksheet. It has problems like those in the Speedway game. I want you to do your best to answer the problems. Then tomorrow, we can begin taking turns being race car drivers."

Activity Notes:

This training activity should stimulate enthusiasm in the students for practicing the skills necessary to do well in the game. As the students continue to play Speedway, the "training" can become an integrated part of the lesson activity. The worksheets can be introduced over a period of several days.

The completed worksheets should help the teacher decide if the students are ready to play Speedway and which levels of the activity are most appropriate.

For the following day, prepare a schedule for the students to play the game.

Sample Narrative:

"All right! Now that you have all gone through the initial training, you are ready to begin your racing careers. The schedule is posted on the bulletin board and you will each have a turn." (If appropriate, give any operating instructions.)

"Tomorrow we will make our own Speedway(s) so that we can keep track of our progress. And remember, we will have to keep in training each day so that we can keep improving and continue to set new records."

Follow Up Classroom Activity

Purpose:

- To reinforce the basic number facts practice with a personal record-keeping method, to provide a record-keeping device, and to integrate the math activity with an art activity.

Materials:

- Construction paper, crayons, scissors, ruler, and masking tape.

Preparation:

- Tell the students that they are going to make their own race cars. They will design a car and pick a name for the driver. They can choose which race they want to run depending on which operations are being practiced.

Activity:

1. Give each student a large piece of construction paper and have them choose another smaller piece of a contrasting color for the car.
2. Tell the students to choose their race and draw a track on the large piece of paper. (The screen display provides an excellent sample for a picture.)
3. Have them use a ruler to draw several checkpoints along the track with blank lines underneath each checkpoint. The blanks will be used to record times. (The car will move along the track from one checkpoint to the next.)
4. Have the students draw, color, and decorate their cars any way they wish. Have them name their drivers.

5. Have the students take a small piece of masking tape, make it into a circle with the sticky side out and use it to stick their car on their track at the starting line.
6. Explain that each time a child plays Speedway and breaks his or her old record, the time can be filled in on the next blank and the car moved down the track toward the finish line.
7. You may want to establish a checking system to make sure the students are accurately recording their times. For example, have other students verify scores.

Additional Activity Ideas

1. A chart could be placed on the bulletin board and small checkered flags placed after each student's name to represent races won or time goals achieved.
2. One large track could be placed on the bulletin board and a small car for each student moved down the track.
3. Integrated as an art activity, the students could simply design and color individual race cars.

VII. STUDENT MATERIALS

The following section contains worksheets and a sample record-keeping sheet.

Four sample worksheets are provided titled "Race Car Driver Training." The worksheets may be used to integrate the practice activity into the Speedway activity. Each worksheet contains problems representative of a particular race with directions and room for name, date, and score information.

The sample record sheet can be posted on the bulletin board to keep track of student's progress.

Teachers are permitted to duplicate these materials or to use them as models.

BASIC NUMBER FACTS: Practice

RACE CAR DRIVER TRAINING

Worksheet 1 - SOAPBOX: Addition and Subtraction

Name: _____ Date: _____

Directions: Work these problems by adding and subtracting.

First Practice Race

1. 6 + 8	2. 2 + 3	3. 0 - 0	4. 10 + 2	5. 6 - 3
6. 17 - 8	7. 6 + 6	8. 7 + 8	9. 10 - 3	10. 16 - 6

SCORE: _____

Worksheet 1 - SOAPBOX: Addition and Subtraction (Cont.)

Name: _____ Date: _____

Directions: Work these problems by adding and subtracting.

Second Practice Race

1. 8 + 9	2. 3 - 2	3. 15 - 8	4. 0 + 7	5. 9 + 3
6. 14 - 6	7. 11 - 4	8. 7 - 3	9. 7 + 3	10. 5 +10

SCORE: ____

BASIC NUMBER FACTS: Practice

RACE CAR DRIVER TRAINING

Worksheet 2 - DRAG RACE: Multiplication

Name: _____ Date: _____

Directions: Work these problems by multiplying.

First Practice Race

1. 4 × 3	2. 7 × 2	3. 9 × 4	4. 6 × 4	5. 10 × 2
6. 4 × 4	7. 8 × 6	8. 6 × 3	9. 7 × 7	10. 5 × 4

SCORE: _____

Worksheet 1 - SOAPBOX: Addition and Subtraction (Cont.)

Name: _____ Date: _____

Directions: Work these problems by adding and subtracting.

Second Practice Race

1. 8 + 9	2. 3 - 2	3. 15 - 8	4. 0 + 7	5. 9 + 3
6. 14 - 6	7. 11 - 4	8. 7 - 3	9. 7 + 3	10. 5 +10

SCORE: ____

BASIC NUMBER FACTS: Practice

RACE CAR DRIVER TRAINING

Worksheet 2 - DRAG RACE: Multiplication

Name: _____ Date: _____

Directions: Work these problems by multiplying.

First Practice Race

1. 4 × 3	2. 7 × 2	3. 9 × 4	4. 6 × 4	5. 10 × 2
6. 4 × 4	7. 8 × 6	8. 6 × 3	9. 7 × 7	10. 5 × 4

SCORE: _____

Worksheet 2 - DRAG RACE: Multiplication (Cont.)

Name: _____ Date: _____

Directions: Work these problems by multiplying.

Second Practice Race

1. 8 × 5	2. 10 × 5	3. 9 × 9	4. 2 × 0	5. 5 × 5
6. 7 × 3	7. 9 × 8	8. 7 × 5	9. 5 × 3	10. 6 × 9

SCORE: _____

BASIC NUMBER FACTS: Practice

RACE CAR DRIVER TRAINING

Worksheet 3 - RALLY: Division

Name: _____ Date: _____

Directions: Work these problems by dividing.

First Practice Race

1. $6\overline{)6}$ 2. $3\overline{)9}$ 3. $10\overline{)100}$ 4. $7\overline{)42}$ 5. $8\overline{)64}$

6. $4\overline{)36}$ 7. $3\overline{)24}$ 8. $5\overline{)50}$ 9. $2\overline{)10}$ 10. $1\overline{)8}$

SCORE: ____

Worksheet 3 - RALLY: Division (Cont.)

Name: _____ Date: _____

Directions: Work these problems by dividing.

Second Practice Race

1.	2.	3.	4.	5.
$10\overline{)60}$	$4\overline{)12}$	$9\overline{)81}$	$8\overline{)0}$	$6\overline{)24}$
6.	7.	8.	9.	10.
$5\overline{)30}$	$7\overline{)35}$	$2\overline{)14}$	$9\overline{)90}$	$7\overline{)49}$

SCORE: _____

BASIC NUMBER FACTS: Practice

RACE CAR DRIVER TRAINING

Worksheet 4 - NATIONAL: Review

Name: _____ Date: _____

Directions: Work these problems by using addition, subtraction, multiplication, and division.

First Practice Race

1. $\begin{array}{r} 6 \\ \times\ 3 \\ \hline \end{array}$	2. $\begin{array}{r} 2 \\ +\ 4 \\ \hline \end{array}$	3. $3\overline{)30}$	4. $\begin{array}{r} 15 \\ -\ 8 \\ \hline \end{array}$	5. $\begin{array}{r} 7 \\ +\ 9 \\ \hline \end{array}$
6. $4\overline{)16}$	7. $\begin{array}{r} 12 \\ -\ 8 \\ \hline \end{array}$	8. $\begin{array}{r} 5 \\ \times\ 5 \\ \hline \end{array}$	9. $\begin{array}{r} 6 \\ \times\ 8 \\ \hline \end{array}$	10. $\begin{array}{r} 3 \\ -\ 3 \\ \hline \end{array}$

SCORE: _____

RACE CAR DRIVER TRAINING

Worksheet 4 - NATIONAL: Review (Cont.)

Name: _____ Date: _____

Directions: Work these problems by using addition, subtraction, multiplication, and division.

Second Practice Race

1. $7\overline{)63}$

2. $12 - 3$

3. 0×8

4. $6 + 9$

5. $2\overline{)14}$

6. 9×8

7. $9 + 8$

8. $17 - 8$

9. $5\overline{)15}$

10. $10 - 2$

SCORE: _____

STUDENT RECORDS

Student	Race	Best Time	Date
	1.		
	2.		
	3.		
	4.		
	1.		
	2.		
	3.		
	4.		
	1.		
	2.		
	3.		
	4.		
	1.		
	2.		
	3.		
	4.		
	1.		
	2.		
	3.		
	4.		

VIII. ANSWER KEY

Worksheet 1 - SOAPBOX

First Race	Second Race
1. 14	1. 17
2. 5	2. 1
3. 0	3. 7
4. 12	4. 7
5. 3	5. 12
6. 9	6. 8
7. 12	7. 7
8. 15	8. 4
9. 7	9. 10
10. 10	10. 15

Worksheet 2 - DRAG RACE

First Race	Second Race
1. 12	1. 40
2. 14	2. 50
3. 36	3. 81
4. 24	4. 0
5. 20	5. 25
6. 16	6. 21
7. 48	7. 72
8. 18	8. 35
9. 49	9. 15
10. 20	10. 54

Worksheet 3 - RALLY

First Race	Second Race
1. 1	1. 6
2. 3	2. 3
3. 10	3. 9
4. 6	4. 0
5. 8	5. 4
6. 9	6. 6
7. 8	7. 5
8. 10	8. 7
9. 5	9. 10
10. 8	10. 7

Worksheet 4 - NATIONAL

First Race	Second Race
1. 18	1. 9
2. 6	2. 9
3. 10	3. 0
4. 7	4. 15
5. 16	5. 7
6. 4	6. 72
7. 4	7. 17
8. 25	8. 9
9. 48	9. 3
10. 0	10. 8

INFORMATION ON ADDITIONAL PRODUCTS

WHOLE NUMBERS

Practice in whole number operations. Interest is developed by use of a simulated pinball game to build skills in addition, subtraction, multiplication, division, and mixed numbers. Designed for elementary and junior high math students.

FRACTIONS

Practice locating fractions on a number line. Students are challenged to "burst" balloons by "throwing" darts at the correct location on the number line. Balloons may be burst in any order, on a trial-and-error basis, until none are left. The exercise may be carried out with or without negative numbers. The difficulty adjusts to the student's performance. Designed for elementary math students.

DECIMALS

Practice locating decimal numbers on the number line. Children are challenged to "burst" balloons by "throwing" darts at the correct location on the

number line. Numbers are entered on a trial-and-error basis. Difficulty adjusts to the student's performance. Designed for elementary math students.

FRENCH VOCABULARY BUILDER

Students are given a basic vocabulary of 500 words including useful verbs, number words, words commonly used in traveling, shopping, in restaurants, or in the home. The format of either "hangperson" or "pyramid building" in structured groups of related words provides students with context and similarity clues to help them increase their proficiency. Designed to supplement introductory-level and refresher courses.

SPANISH VOCABULARY BUILDER

Students are given a basic vocabulary of 500 words including useful verbs, number words, words commonly used in traveling, shopping, in restaurants, or in the home. The format of either "hangperson" or "pyramid building" in structured groups of related words provides students with context and similarity clues to help them increase their proficiency. Designed to supplement introductory-level and refresher courses.

GERMAN VOCABULARY BUILDER

Students are given a basic vocabulary of 500 words including useful verbs, number words, words commonly used in traveling, shopping, in restaurants, or in the home. The format of either "hangperson" or "pyramid building" in structured groups of related words provides students with context and similarity clues to help them increase their proficiency. Designed to supplement introductory-level and refresher courses.

COMPUTER LITERACY-INTRODUCTION

This lesson is a foundation for a full curriculum in computer literacy or simple programming. It gives a brief introduction to the history, uses, and issues surrounding computers in today's society presented in a friendly, nonintimidating manner with touches of humor and simple supportive graphics. Designed for junior or senior high and vocational school students.

PHYSICS - ELEMENTARY MECHANICS

This is a problem-solving lesson in the elementary mechanics of physics. Students are shown a physical problem and an initial budget of $25. They must "purchase" missing pieces of information required to answer the problem correctly. Once enough information is gathered, the student calculates the answer. The objective is to request the least amount of necessary information to understand the problem, thus "spending" the least amount of money. The emphasis is on understanding the problem, rather than just supplying the correct answers. Designed for senior high physics students.

These lessons have been designed for use by students at specific grade levels, but you don't have to be a student to enjoy these lessons as refresher exercises, skill building tools, or recreation.

NOTES